Sphagnum subobesum Warnst. in North America

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The presence of *Sphagnum subobesum* Warnst. in British Columbia has been briefly noted previously (Schofield, 1969; Andrus & Vitt, 1977) but the unusualness of the record merits more substantial discussion. Previously the species was known only from Japan (Suzuki, 1958) where it occurs quite widely in northern Honshu and less abundantly on Hokkaido. A strong correlation exists between the British Columbian and Japanese moss floras with approximately half the British Columbia species also occurring in Japan (Schofield, 1965). The communality is much stronger in *Sphagnum* where, out of an estimated 36 British Columbian species and 43 Japanese species, 32 occur in common. The estimates are based on Schofield (1968) and Suzuki (1972), supplemented by personal investigations. *Sphagnum subobesum* is one of numerous byrophytes with a North Pacific distribution (Schofield, 1969). Its center of distribution is clearly in Japan with the North American records probably remnants of formerly more widely dispersed and abundant populations, a pattern shared with several other species, e.g., *Pleuroziopsis ruthenica* and *Hypopterygium fauriei* (Schofield, 1965).

The Queen Charlotte Islands, where the two known *S. subobesum* stations are found, are a logical place for such a relict disjunct to occur. Species with North Pacific distributions have a strong affinity for moist climates and are seldom seen very far inland. In this respect, the Queen Charlotte Islands are ideal, having a climate of exceptional moistness and mildness for their latitude. At Sandspit, for example, a few miles from the Moresby Lake *S. subobesum* site, average monthly means range from 36°F in January to 58°F in August with 20°F the average low for the year and 72°F the average high. Due to the strong orographic effects induced by the extremely mountainous terrain, the precipitation varies dramatically, ranging from 40-50 inches/year for eastern coastal settlements in the rain shadow to 200 or more inches/year on the western slopes. A pronounced summer dry season occurs throughout the islands in July and August. At lower elevations, 90% or more of the yearly total falls as snow while at upper elevations an unknown but high percentage falls as snow as evidenced by permanent ice fields (Calder & Taylor, 1968).

Probably because of the dry season, many of the more unusual species that occur here, especially disjuncts, are found in protected, moist microsites where moisture is abundant year round. Both known *S. subobesum* sites are protected steep rock faces that were wet when collections were made during the dry season. At the Moresby Lake site, *S. subobesum* grew in some abundance with *Sphagnum compactum* DC., *S. tenellum* (Brid.) Brid., *S. subsecundum* Nees., *S. papillosum* Lindb., *Campylopus atrovirens* DeNot., *Hypnum dieckii* Ren. & Card. and a profusion of leafy liverworts of which *Herberta adunca* (Dicks.) Gray, *Pleurozia purpurea* (Lightf.) Lind., *Scapania undulata* (L.) Dumort, *Calypogeia muelleriana* (Schiffn.) K. Müll, *Anthelia julacea* (L.) Dumort, and a *Bazzania* species apparently unreported for North America (N.G. Miller, in lit.) were especially prominent. It seems quite likely that further collecting will discover more *S. subobesum* in similar sheltered microsites within the maritime climatic belt along the British Columbian and Alaskan coasts and perhaps even through the Aleutian Islands. Such a pattern could be expected in view of Schofield's (1969) suggestion that many North Pacific species expanded their ranges not by the Bering land bridge but rather via the Aleutians.

DESCRIPTION

Sphagnum subobesum Warnst. 1900, Section *Subsecunda*

Plants ± moderate-sized, with an aspect intermediate between that of *S. subsecundum* and *S. tenellum*, much like smaller forms of *S. lescurii*. Stem green on new growth to dark brown on old growth; cortex one layer of enlarged thin-walled cells with 1-2 large, round, wall-thinnings per cell. Stem leaves ranging from 0.9 mm long in anisophyllous forms to 1.4 mm long in isophyllous forms, often at right angles to stems, lingulate in anisophyllous forms to ovate in isophyllous forms, concave; apex rounded and erose to weakly toothed; border narrow; hyaline cells undivided, on anisophyllous forms with scattered pores in the cell angles in the apical 1/3 of the leaf on both convex and concave surfaces, on isophyllous forms with pores on the convex surface in continous rows along the commissures at the apex but toward the base becoming less frequent and restricted to cell apices and angles, efibrillose throughout in anisophyllous forms and fibrillose throughout in isophyllous forms. Branch fascicles with two spreading branches and one hanging branch. Branch leaves from middle of spreading branches quite variable in size (0.9 to 1.7 mm long), short ovate to ovate, straight or very slightly falcate-secund, concave; the convex surface with round to elliptic pores (4-7 μ) in ± continuous rows along the commissures, these rows becoming progressively less

continous toward the base until restricted to cell angles and apices; concave surface aporose; chlorophyll cells truncate-elliptic and exposed evenly on both surfaces.

SPECIMEN CITATIONS:

1. Pocket Inlet, SE end, glacially scoured, largely barren slope, W Moresby Island, Queen Charlotte Islands, 52°35'N, 131°50'W. July 12, 1966, Schofield 31491 (DUKE)

2. Moresby Lake, Moresby Island, Queen Charlotte Islands. 52°56'N, 132°06'W. On wet slope; assoc. with *S. compactum*, *S. tenellum* and *S. subsecundum*, 28/VI/1975. Andrus & Vitt 3374 (NY, US, CN, DUKE, FH, MICH)

3. Moresby Lake, Moresby Island, Queen Charlotte Islands, E. Corner of Moresby Lake. 52°56'N, 132°06'W, 450 ft. elev., on steep, wet, NW facing slope, mixed with *Sphagnum compactum* and *Herberta adunca*. 30/VI/1975. Sphagnotheca Boreali-americana No. 82 (distribution as noted in Andrus & Vitt,1975)

SIMILAR SPECIES

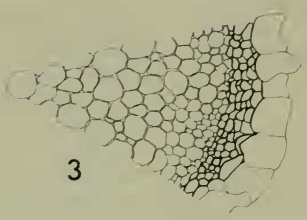
The continuous rows of pores along the branch leaf hyaline cell commissures and the truncate-elliptic chlorophyll cell cross-section easily place *S. subobesum* in the *Subsecunda*. Four other *Subsecunda* occur in western North America. Of these, *S. orientale* L. Sav. and *S. contortum* K.F. Schultz are separated by the very small size of their branch leaf pores, less than 2 μ in diameter. *Sphagnum platyphyllum* (Braithw.) Warnst. also often has pores this small but some forms do not. Large-pored forms, particularly isophyllous ones, are very similar to *S. subobesum* in many details but will differ clearly in the branch leaf pore pattern. In *S. subobesum*, the pores grade from continuous rows near the leaf apex to scattered occurrences only in the cell apices and corners at the leaf base. *Sphagnum platyphyllum* may not always exhibit continuous rows of pores but, whatever the pore character, it will remain constant from leaf apex to base. The actual taxonomic problems are minimal, however, since *S. platyphyllum* has a continental distribution and *S. subobesum* has an oceanic distribution. Distributional details for *S. platyphyllum* are unclear but it seems possible it does not overlap *S. subobesum* in range.

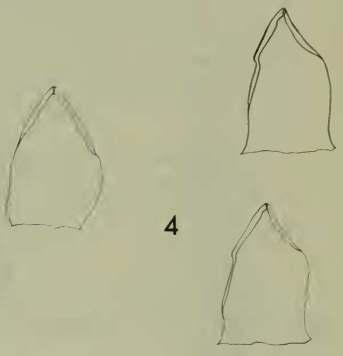
Sphagnum subsecundum Nees. *sensu stricto*, though, has substantial phytogeographic and morphological similarities with *S. subobesum*, especially in Japan (Suzuki, 1972). *Sphagnum subsecundum* occurs widely on the Queen Charlotte

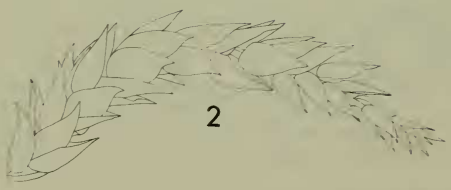
Islands and in one case is quite abundant on the same site as *S. subobesum*. The two species differ in several ways, however, as Table 1 indicates.

Sphagnum subsecundum	*Sphagnum subobesum*
Stem leaves < 1.0 mm long usually ≤ 0.8; usually anisophyllous, sometimes hemiisophyllous; appressed to stem.	Stem leaves ≥ 1.0 mm long (rarely 0.9 mm); usually hemiisophyllous to isophyllous; often at right angles to stem.
Fascicles of two spreading and two hanging branches.	Fascicles of two spreading and one hanging branch.
Branch leaves ± 1.2 mm long (0.8-1.5); hyaline cells throughout the leaf with pores continuous rows along the commissures.	Branch leaves ± 1.5 mm long (0.9-1.7); hyaline cells with pores in continuous rows along the commissures in cells near the apex, grading to cells at the leaf base with pores only in the cell ends and corners.

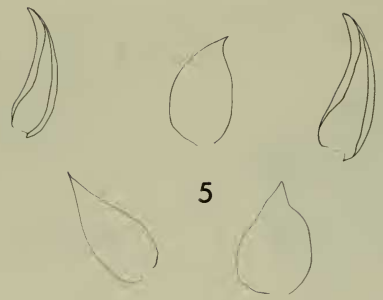
Table 1. Comparison of *Sphagnum subsecundum* and *S. subobesum*

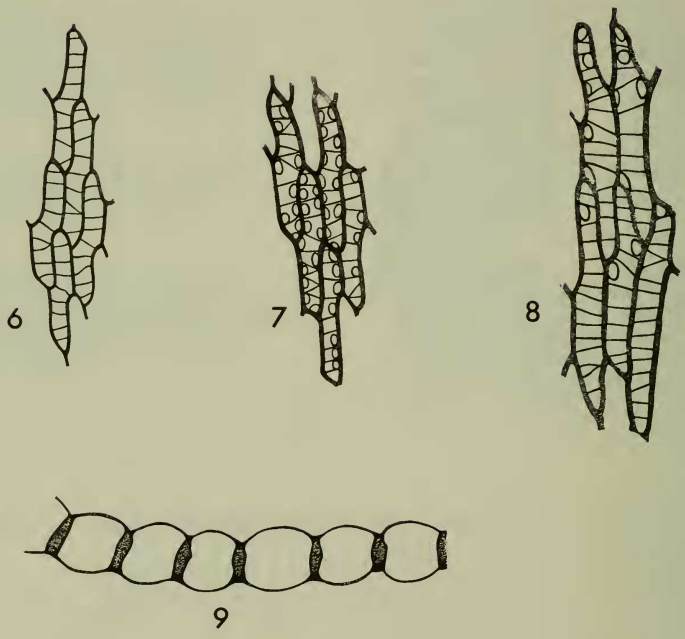






Sphagnum subobesum Warnst. -1. Habit. x 2.4. -2. Spreading branch. x 8. -3. Stem transverse section. x 215. -4. Stem leaves x 15.





Sphagnum subobesum Warnst. -5. Branch leaves. x 15. -6. Branch leaf concave surface. x 180. -7. Branch leaf convex surface, apical region. x 180. -8. Branch leaf convex surface, basal region. x 180. -9. Branch leaf transverse section. x 340. Drawings by Steven Sierigk.

Sphagnum subobesum, like *S. platyphyllum* and the amphiatlantic Subsecunda species *S. lescurii* Sull., is hydrolabile (Suzuki, 1958) and apparently well adapted for habitats where hydrologic stress is significant, e.g., sites where plants may go through frequent wet-dry cycles. In the heart of its range in Japan, *S. subobesum* exhibits a great variety of forms with respect to habit, leaf size, and leaf shape. As to habitat, *S. subobesum* may be found both submerged and emergent, with the submerged forms often producing subsimplex modifications. As in *S. lescurii* (Andrus, 1974), modified stem leaves are common. The full range of morphological variability is substantially greater than the description herein would indicate, but that description is based upon North American material growing at the extreme of its range under probably ideal conditions. *Sphagnum subsecundum*, by contrast, is hydrostable and nearly always anisophyllous.

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